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sequence 1400 does not include the oxide etching or ashing but includes the previously described barrier strip step 48 and cleaning step 50, if the latter is needed. Thereafter, the process remains quite similar to that of FIG. 6 or 9 with the lower-pressure sequence 62' including the two sputtering steps 58, 60.

In the drawings:

Please amend FIGS. 9, 10, and 11 as marked on the attached copies thereof.

In the claims:

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1. (Amended) An integrated etch and metal liner process of a substrate including a dielectric layer and covered with a patterned mask material, comprising the steps of:
transferring the substrate into a transfer chamber held at a first pressure below atmospheric pressure;
transferring the substrate from the transfer chamber to an etching chamber and etching according to said patterned mask material through said oxide layer to said etch stop layer to form a hole in said oxide layer;
ashing said mask material;
removing said etch stop layer exposed at a bottom of said hole;
transferring said wafer to a metallization chamber through said transfer chamber and without exposing the substrate to an atmospheric pressure;
depositing a barrier layer in said metallization chamber; and
depositing a seed layer.

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2. The process of Claim 1, wherein said metal seed layer is a copper seed layer.

3. The process of Claim 2, wherein said barrier layer comprises tantalum.

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4. The process of Claim 1, wherein at least one of said two depositing steps is a sputtering step.

5. (Amended) An integrated etch and metal liner process of a substrate including a stop layer covered with a dielectric layer covered with a patterned mask material, comprising the steps of:

etching according to said mask through said oxide layer to said etch stop layer to form a hole in said oxide layer;

ashing said mask material;

removing said etch stop layer exposed at a bottom of said hole;

transferring said substrate to a transfer chamber maintained at a sub-atmospheric pressure;

in a reactor coupled to said transfer chamber, depositing a barrier layer; and

in a reactor coupled to said transfer chamber, depositing a metal seed layer;

wherein said substrate is maintained between said etching, ashing and removing steps and during said transferring steps at sub-atmospheric pressures.

6. The process of Claim 5, wherein said barrier layer comprises tantalum.

7. The process of Claim 5, wherein at least one of said depositing steps is a sputtering step.

8. The process of Claim 5, wherein said transfer chamber is maintained at a pressure of less than 10^{-6} Torr.

9. An integrated etch and metal liner process of a substrate including a stop layer covered with an oxide layer covered with a patterned photoresist mask, comprising the steps of:

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a first step of transferring said substrate into a first transfer chamber maintained at a pressure of no more than 1 Torr,

a second step of transferring said substrate from said first transfer chamber to an oxide etch reactor:

in said oxide etch reactor, etching said oxide layer according to said mask to form a hole in said oxide layer;

a third step of transferring said substrate from said oxide etch reactor through said first transfer chamber to a second transfer chamber maintained at a pressure of no more than 10^{-6} Torr;

a fourth step of transferring said substrate from said second transfer chamber to at least one reactor to deposit a layer in said hole.

10. The process of Claim 9, further comprising ashing said photoresist layer in said oxide etch reactor.

(Please cancel Claims 12 and 13.)

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11. (Amended) The process of Claim 9, further comprising:
a fifth step of transferring said substrate from said oxide etch reactor through said first transfer chamber to a plasma ashing reactor attached to said first transfer chamber; and
in said plasma ashing reactor, ashing said photoresist layer;
wherein said third step of transferring comprises transferring said substrate from said plasma ashing reactor through said first transfer chamber to said second transfer chamber.

14. (New) An integrated process performed in processing reactors connected to at least one central vacuum transfer chamber held at pressures of no more than 1 Torr, said processing reactors and said at least one central vacuum transfer station being formed on a single platform,

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said process comprising the steps of:

loading into said at least one central vacuum transfer chamber through a load lock a substrate having a dielectric layer covered by a patterned resist material;

in at least one etching reactor connected to said at least one central vacuum transfer chamber through a respective slit valve, etching said dielectric layer in said substrate according to said patterned resist material to form a hole therethrough and thereafter ashing said resist material;

in at least one deposition reactor connected to said at least one central vacuum transfer chamber through a respective slit valve, depositing a liner layer on sides of said hole;

wherein said substrate is not exposed to atmospheric pressure between said etching step and said depositing step.

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15. (New) The process of Claim 14, wherein said liner layer includes a barrier layer and a copper seed layer.

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16. (New) The process of Claim 14, wherein said at least one deposition reactor includes a sputter reactor with a copper target for depositing said copper seed layer.

17. (New) The process of Claim 14, wherein said at least one etching reactor includes an etch reactor for etching said dielectric layer and an ashing reactor for ashing said resist material.

18. (New) The process of Claim 14, wherein said at least one central vacuum transfer station includes a first central vacuum transfer chamber to which said at least one etching reactor is connected through its respective slit valve and a second central vacuum transfer chamber to which said at least one deposition reactor is connected through its respective slit valve and said platform further comprises a doubly gated vacuum passageway between said first and second central vacuum transfer chambers.

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19. (New) The process of Claim 18, wherein said etching reactors includes an etch reactor for etching said dielectric layer and an ashing reactor for ashing said resist material and wherein said deposition reactor includes a first sputter reactor for depositing at least a part of a barrier layer and a second sputter reactor for depositing a copper seed layer.

20. (New) The process of Claim 18, wherein said second central vacuum transfer chamber is held at a pressure of no more than 10^{-6} Torr.

21. (New) The process of Claim 14, wherein said at least one central vacuum chamber consists of a single central vacuum transfer chamber.
